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Shoichiro Watanabe

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EXAMINER

ARCIERO, ADAM A

ART UNIT

PAPER NUMBER

1727

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/552,920

Applicant(s)

WATANABE ET AL.

Examiner

ADAM A. ARCIERO

Art Unit

1727

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1727

**NONAQUEOUS ELECTROLYTE BATTERY AND CHARGE/DISCHARGE SYSTEM
THEREOF**

Examiner: Adam Arciero

S.N. 10/552,920

Art Unit: 1727

March 2, 2011

DETAILED ACTION

1. The Applicant's amendment filed on December 23, 2010 was received. Claims 1 and 4-9 are currently pending. Claims 1 and 4 have been amended. Claims 10-13 have been canceled.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

3. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. and Goto et al. on claims 1, 6, 8, 10 and 12 are maintained.

As to Claims 1, 6, 8, 10 and 12, Inoue et al. teaches a lithium-ion battery comprising a positive electrode having an active material layer, a negative electrode comprising a negative active material layer, a separator and a lithium-ion conductive non-aqueous electrolyte (col. 6, lines 30-61). Said positive active material comprises a lithium transition metal composite oxide (col. 11, lines 10-50) and said negative material comprises graphite (claim 8) (col. 15, lines 24-45) which is capable of intercalating and deintercalating lithium ions (col. 6, lines 30-61). The final charge voltage of said non-aqueous battery is set to 4.3 V (col. 44, Example 2). Inoue et al. teaches a positive active material comprising a lithium transition metal composite oxide represented by the formula: $\text{Li}_x\text{Co}_a\text{Ni}_{1-a}\text{O}_2$ wherein $x=0.2$ to 1.2 and $a=0.1$ to 0.9 . The prior art

Art Unit: 1727

ranges taught by Inoue et al. overlap the claimed ranges. The courts have held that in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (claims 10 and 12). Inoue et al. does not specifically disclose wherein the lithium composite oxide further comprises at least two of the elements selected from the group of claim 1. Inoue et al. does not expressly disclose the capacity ratio of the positive active material to negative active material as being 1.5 to 2.2. However, Inoue et al. teaches the ratio for the contents of the positive active material and negative material, depending on the varieties of the compounds and formulations of the compositions, can be optimized so as to improve the capacity, cycle life and safety of the battery (col. 33, lines 36-59). Inoue et al. is teaching that said ratio is a results effective variable. The courts have held that optimization of a results effective variable is not novel. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

However, Goto et al. teaches of a lithium secondary battery comprising a positive active material comprising the compound represented by the general formula of $\text{LiCo}_{1-y}\text{M}_y\text{O}_2$; where $0 \leq y < 1$ and wherein M can be Al and Ni (paragraph [0039]). The prior art ranges taught by Goto et al. overlap the claimed ranges. The courts have held that in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (claims 10 and 12). Furthermore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the battery of Inoue et al.

Art Unit: 1727

with the positive active material of Goto et al., because Goto et al. teaches that the battery will exhibit a high discharge capacity upkeep ratio (paragraph [0114]).

4. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Inoue et al., Goto et al. and Shoichiro et al. on claims 4-5, 9, 11 and 13 are maintained.

As to Claim 4, 9, 11 and 13, Inoue et al. teaches a lithium-ion battery comprising a positive electrode having an active material layer, a negative electrode comprising a negative active material layer, a separator and a lithium-ion conductive non-aqueous electrolyte (col. 6, lines 30-61). Said positive active material comprises a lithium transition metal composite oxide (col. 11, lines 10-50) and said negative material comprises graphite (claim 8) (col. 15, lines 24-45) which is capable of intercalating and deintercalating lithium ions (col. 6, lines 30-61). The final charge voltage of said non-aqueous battery is set to 4.3 V (col. 44, Example 2). INOUE et al. teaches a positive active material comprising a lithium transition metal composite oxide represented by the formula: $\text{Li}_x\text{Co}_a\text{Ni}_{1-a}\text{O}_2$ wherein $x=0.2$ to 1.2 and $a=0.1$ to 0.9 . The prior art ranges taught by Inoue et al. overlap the claimed ranges. The courts have held that in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Inoue et al. does not specifically disclose wherein the lithium composite oxide further comprises at least two of the elements selected from the group of claim 1.

However, Goto et al. teaches of a lithium secondary battery comprising a positive active material comprising the compound represented by the general formula of $\text{LiCo}_{1-y}\text{M}_y\text{O}_2$; where 0

Art Unit: 1727

$\leq y < 1$ and wherein M can be Al and Ni (paragraph [0039]). The prior art ranges taught by Goto et al. overlap the claimed ranges. The courts have held that in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (claims 10 and 12). Furthermore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the battery of Inoue et al. with the positive active material of Goto et al., because Goto et al. teaches that the battery will exhibit a high discharge capacity upkeep ratio (paragraph [0114]).

Inoue et al. and Goto et al. does not expressly disclose a lithium transition metal composite oxide comprising two composite oxides represented by the two separate formulas in claim 4.

However, Shoichiro et al. teaches a nonaqueous electrolyte secondary battery having a positive active material mixture comprising two positive active materials (Abstract). The first active material is $\text{Li}_x\text{Co}_y\text{M}_w\text{O}_z$ wherein $x=0.9$ to 1.1 , $y=0.85$ to 0.98 , $w=0.02$ to 0.15 and $z=1.8$ to 2.2 and M is at least one of Al, Cu, Zn, Mg, Ca, Ba and Sr (Abstract). The second positive material is represented by the formula $\text{Li}_a\text{Ni}_b\text{M}'_c\text{O}_d$ where $a=0.3$ to 1.02 , $b=0.5$ to 0.98 , $c=0.02$ to 0.5 , $d=1.8$ to 2.2 and M' is at least one of Co, Mn, Cr, Fe, V and Al (Abstract). These ranges overlap or lie inside the claimed ranges of the present application. The courts have held that in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (claims 11 and 13). Therefore, at the time of the invention, it would have been obvious to a person having ordinary

Art Unit: 1727

skill in the art to use a mixture of the two positive active materials described above because Shoichiro et al. teaches that a discharge capacity is heightened while creating a low temperature characteristic and improving a cycle characteristic (Abstract).

Inoue et al., Goto et al. and Shoichiro et al. does not expressly disclose the capacity ratio of the positive active material to negative active material as being 1.5 to 2.2. However, Inoue et al. teaches the ratio for the contents of the positive active material and negative material, depending on the varieties of the compounds and formulations of the compositions, can be optimized so as to improve the capacity, cycle life and safety of the battery (col. 33, lines 36-59). Inoue et al. is teaching that said ratio is a results effective variable. The courts have held that optimization of a results effective variable is not novel. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

As to Claim 5, Inoue et al. teaches the ratio for the contents of the positive active material and negative material, depending on the varieties of the compounds and formulations of the compositions, can be optimized so as to improve the capacity, cycle life and safety of the battery (col. 33, lines 36-59). Inoue et al. is teaching that said ratio is a results effective variable. The courts have held that optimization of a results effective variable is not novel. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

5. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Inoue et al., Goto et al. and Fernandez et al. on claim 7 is maintained.

Art Unit: 1727

As to Claim 7, Inoue et al. and Goto et al. does not expressly disclose a charge/discharge system comprising a battery as recited in claim 1 and a charger, wherein said charger is set to stop charging when the voltage of said battery reaches 4.25 to 4.5 volts.

However, Fernandez et al. teaches a charger for lithium ion cells wherein an overvoltage based disconnect circuit is used so as to disconnect the battery from the charger if the voltage of the cell reaches a threshold level (col. 1, lines 56-65). At the time of the invention, it would have been obvious to a person having ordinary skill in the art to employ a charger for charging the battery of Inoue et al. with a disconnect circuit so as to stop charging the battery of Inoue et al. when said battery reaches its final charge voltage of said non-aqueous battery is set to 4.3 V (col. 44, Example 2), so as to protect the battery from overcharging, as suggested by Fernandez et al.

Response to Arguments

6. Applicant's arguments with respect to independent claims 1 and 4 have been considered but are not persuasive.

Applicant's principle arguments are:

a) *Applicant's present disclosure displays unexpected results which were not discussed nor suggested in the prior art. The unexpected results are found in Table 2 of the instant disclosure and shows batteries 16, 17, 20, 21, 24 and 25 wherein the value of y is of 0.051 or less and the capacity maintenance ratio of the batteries are about 70%, compared batteries where y is greater than 0.051 where capacity maintenance ratios are about 80% (claims 1 and 4).*

b) Goto et al. does not teach a material which falls within the claimed range of 0.051 to 0.15 (claims 1 and 4).

Art Unit: 1727

c) Shoichiro does not teach positive electrode active mixtures with two or more selected from Mg, Al, Ti, Sr, Mn, Ni and Ca (claims 1 and 4).

In response to Applicant's arguments, please consider the following comments:

a) Applicant's results provided in Table 2 are not commensurate with the scope of the claims. For example, Batteries 20-21 have a y value equal to 0.051, which is the exact lower limit value of the claimed range. Therefore, Applicant's are arguing that batteries which fall within the claimed range, show below average results compared to other batteries within the claimed range. Not all of the results are unexpected. Furthermore, the results are not found to be significant, whereas batteries 16-17 and 24-25 display capacity results up to 76%, which is not significantly greater than Battery 29, for example which has a value of up to 80%. Furthermore, the ratio of W_p/W_n appears to have a larger impact on the final results, for example Battery 9, wherein the value of y is 0.051 (within the claimed range) and the ratio is 2.40 (outside the claimed range) and the capacity values are significantly lower.

b) Goto et al. teaches of a lithium secondary battery comprising a positive active material comprising the compound represented by the general formula of $\text{LiCo}_{1-y}\text{M}_y\text{O}_2$; where $0 \leq y < 1$ and wherein M can be Al and Ni (paragraph [0039]). The prior art ranges taught by Goto et al. overlap the claimed ranges.

c) Shoichiro et al. teaches a nonaqueous electrolyte secondary battery having a positive active material mixture comprising two positive active materials (Abstract). The first active material is $\text{Li}_x\text{Co}_y\text{M}_w\text{O}_z$ wherein $x=0.9$ to 1.1 , $y=0.85$ to 0.98 , $w=0.02$ to 0.15 and $z=1.8$ to 2.2 and M is at least one of Al, Cu, Zn, Mg, Ca, Ba and Sr (Abstract). The second positive material

Art Unit: 1727

is represented by the formula $\text{Li}_a\text{Ni}_b\text{M}'_c\text{O}_d$ where $a=0.3$ to 1.02 , $b=0.5$ to 0.98 , $c=0.02$ to 0.5 , $d=1.8$ to 2.2 and M' is at least one of Co, Mn, Cr, Fe, V and Al (Abstract).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 7am to 4pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1727

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Adam A Arciero/
Examiner, Art Unit 1727

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1727